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EXAMINER				
COHEN, STEFANIE J				
ART UNIT		PAPER NUMBER		
1793				
NOTIFICATION DATE		DELIVERY MODE		
06/02/2009		ELECTRONIC		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ADIPFDD@bipc.com

Office Action Summary

Application No.

10/533,227

Applicant(s)

BONNET ET AL.

Examiner

STEFANIE COHEN

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 February 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 20-39 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 20-39 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/CDC)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____
- Paper No(s)/Mail Date _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 20, 21, 32-36 and 38 are rejected under 35 U.S.C. 102(b) as being unpatentable by Onopchenko et al (4032569).

Onopchenko, col. 1 lines 5-11, teaches a process for converting cyclohexane to adipic acid which comprises oxidizing cyclohexane with molecular oxygen in the presence of critical amounts of cobaltic ions in an aliphatic monobasic acid solvent while maintaining critical temperature, pressure and contact time in the reaction zone.

Cyclohexane is a cycloaliphatic hydrocarbon and adipic acid is a dicarboxylic acid. The cobaltic ion is an oxidation catalyst.

Further, Onopchenko, col. 1 lines 35-45, teaches the aliphatic monobasic acid solvent can be caprylic acid (octanoic acid) which is also considered a lipiphilic oxidation solvent.

Further, Onopchenko, col. 3 lines 10-20, teaches the residue is extracted with acetone to separate the organic product from the catalyst. The individual

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acids can be separated from each other in any conventional manner, for example, by crystallization from conventional solvents such as benzene or water.

Regarding claim 21, Onopchenko, col. 1 lines 35-45, teaches the aliphatic monobasic acid solvent can be caprylic acid (octanoic acid) which is also considered a lipiphilic oxidation solvent. Caprylic acid is known in the art as a monocarboxylic acid.

Regarding claims 32 and 33, Onopchenko the hydrocarbon is cyclohexane.

Regarding claims 34 and 35, Onopchenko, col. 1 lines 35-45, teaches the aliphatic monobasic acid solvent can be caprylic acid (octanoic acid) which is also considered a lipiphilic oxidation solvent. Caprylic acid is a monocarboxylic acid having 8 carbons.

Regarding claim 36, Onopchenko teaches the catalyst is cobalt.

Regarding claim 38, the dicarboxylic acids produced are adipic acid. Further, Onopchenko, col. 3 lines 28-31, teaches evaporation of acetone will leave behind the additional adipic, glutaric and succinic acids.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Onopchenko et al (4032569) in view of Robbins (3988116).

Onopchenko, col. 1 lines 5-11, teaches a process for converting cyclohexane to adipic acid which comprises oxidizing cyclohexane with molecular oxygen in the presence of critical amounts of cobaltic ions in an aliphatic monobasic acid solvent while maintaining critical temperature, pressure and contact time in the reaction zone.

Cyclohexane is a cycloaliphatic hydrocarbon and adipic acid is a dicarboxylic acid. The cobaltic ion is an oxidation catalyst.

Further, Onopchenko, col. 1 lines 35-45, teaches the aliphatic monobasic acid solvent can be caprylic acid (octanoic acid) which is also considered a lipiphilic oxidation solvent.

Further, Onopchenko, col. 3 lines 10-20, teaches the residue is extracted with acetone to separate the organic product from the catalyst. The individual

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acids can be separated from each other in any conventional manner, for example, by crystallization from conventional solvents such as benzene or water.

Although Onopchenko teaches extraction of the organic product from the catalyst and separation of individual acids, Onopchenko does not teach using a counter current flow liquid liquid extraction column.

Robbins teaches an apparatus for countercurrent liquid liquid extraction. Robbins, col. 1 lines 5-15, teaches the objective is to remove one or more components from a liquid mixture by intimate contact with a second liquid. The second liquid is thus immiscible with the liquid mixture, but it functions as a solvent for removing the components from the mixture. A conventional apparatus widely used for performing liquid-liquid extractions is known as a sieve tray column, sometimes referred to as a perforated plate column.

Robbins, col. 3 lines 65-68, teaches a suitable extraction solvent is water.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the apparatus as taught by Robbins for extraction of the acids as taught by Onopchenko because Robbins teaches this is a conventional apparatus widely used for performing liquid-liquid extractions. Further, Robbins teaches the improved design overcomes a space problem and therefore increases the flow capacity of the column.

Claims 23-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Onopchenko et al (4032569) as applied to claim 20 and further in view of Robbins (3988116).

Although Onopchenko teaches extraction of the organic product from the catalyst and separation of individual acids, Onopchenko does not teach other methods of extraction.

Robbins teaches an apparatus for countercurrent liquid liquid extraction. Robbins, col. 1 lines 5-15, teaches the objective is to remove one or more components from a liquid mixture by intimate contact with a second liquid. The second liquid is thus immiscible with the liquid mixture, but it functions as a solvent for removing the components from the mixture. A conventional apparatus widely used for performing liquid-liquid extractions is known as a sieve tray column, sometimes referred to as a perforated plate column.

Robbins, col. 3 lines 65-68, teaches a suitable extraction solvent is water.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the apparatus as taught by Robbins for extraction of the acids as taught by Onopchenko because Robbins teaches this is a conventional apparatus widely used for performing liquid-liquid extractions. Further, Robbins teaches the improved design overcomes a space problem and therefore increases the flow capacity of the column.

Further, Robbins, col. 3 lines 15-30, teaches in a typical operation the column is adapted to receive a first liquid, which is carried upwardly through the annular space and the side openings in the tubular members. At the top of the column the liquid is discharged through the upper outlet. A second liquid is passed into the column through the upper inlet, is carried downwardly through each tubular member, and is discharged through the lower outlet.

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Therefore, the cycloaliphatic hydrocarbon is maintained in the liquid state in the column.

Regarding claims 25 and 26, Robbins, col. 3 lines 65-68, teaches a suitable extraction solvent is water.

Claims 27, 29-30 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Onopchenko et al (4032569) as applied to claim 20 and further in view of Ludmer et al (4954206).

Although Onopchenko teaches extraction of the organic product from the catalyst and separation of individual acids, Onopchenko does not teach using a counter current flow liquid liquid extraction column.

Ludmer teaches a countercurrent separation process and apparatus. Ludmer, col. 1 lines 60-68, teaches two solvents are selected which at a first temperature are essentially completely miscible and at a second temperature are immiscible. These solvents are passed in countercurrent flow through a multi stage separation path of a series of alternating mixer zones and settler zones.

Further, Ludmer, Fig. 2, teaches solvent A is fed to the top of the column and solvent B is fed to the bottom of the column via counter current flow therethrough.

Further, Ludmer, table 1a, gives a list of two component systems of solvent A and solvent B.

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It would have been obvious to one of ordinary skill in the art at the time of the invention to use the apparatus as taught by Ludmer for extraction of the acids as taught by Onopchenko because Ludmer teaches a high degree of purity and provides a high selectivity and maximum quantitative separation and recovery of the desired product at minimum time and expense compared to conventional methods.

Regarding claim 29, Ludmer, table 1a, teaches solvent A to be water and solvent B to be phenol which is an aromatic hydrocarbon.

Regarding claim 30, it would have been obvious to one of ordinary skill in the art at the time of the invention to substitute cyclohexane in for phenol as taught by Ludmer because both phenol cyclohexane is immiscible in water and therefore purification process would result in the same products. Further, it would have been obvious to one of ordinary skill in the art at the time of the invention to use cyclohexane as a solvent in order to save on materials and cost of the overall reaction.

Regarding claim 39, Ludmer, Fig. 2, teaches solvent A is fed to the top of the column and solvent B is fed to the bottom of the column via counter current flow therethrough.

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Claims 28 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Onopchenko et al (4032569) in view of Ludmer et al (4954206).

Onopchenko, col. 1 lines 5-11, teaches a process for converting cyclohexane to adipic acid which comprises oxidizing cyclohexane with molecular oxygen in the presence of critical amounts of cobaltic ions in an aliphatic monobasic acid solvent while maintaining critical temperature, pressure and contact time in the reaction zone.

Cyclohexane is a cycloaliphatic hydrocarbon and adipic acid is a dicarboxylic acid. The cobaltic ion is an oxidation catalyst.

Further, Onopchenko, col. 1 lines 35-45, teaches the aliphatic monobasic acid solvent can be caprylic acid (octanoic acid) which is also considered a lipiphilic oxidation solvent.

Further, Onopchenko, col. 3 lines 10-20, teaches the residue is extracted with acetone to separate the organic product from the catalyst. The individual acids can be separated from each other in any conventional manner, for example, by crystallization from conventional solvents such as benzene or water.

Although Onopchenko teaches extraction of the organic product from the catalyst and separation of individual acids, Onopchenko does not teach using a counter current flow liquid liquid extraction column.

Ludmer teaches a countercurrent separation process and apparatus. Ludmer, col. 1 lines 60-68, teaches two solvents are selected which at a first temperature are essentially completely miscible and at a second temperature are

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immiscible. These solvents are passed in countercurrent flow through a multi stage separation path of a series of alternating mixer zones and settler zones.

Further, Ludmer, Fig. 2, teaches solvent A is fed to the top of the column and solvent B is fed to the bottom of the column via counter current flow therethrough.

Further, Ludmer, table 1a, gives a list of two component systems of solvent A and solvent B.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the apparatus as taught by Ludmer for extraction of the acids as taught by Onopchenko because Ludmer teaches a high degree of purity and provides a high selectivity and maximum quantitative separation and recovery of the desired product at minimum time and expense compared to conventional methods.

Further, Ludmer, Fig. 2, teaches solvent A is fed to the top of the column and solvent B is fed to the bottom of the column via counter current flow therethrough.

Regarding claim 31, Ludmer, col. 5 lines 35-45, teaches a feed mixture to be separated is fed to an intermediate point in the column.

Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Onopchenko et al (4032569) as applied to claim 36.

Although Onopchenko teaches a cobalt catalyst, Onopchenko does not teach elements that can be used as a catalyst.

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It would have been obvious to one of ordinary skill in the art at the time of the invention that manganese and a co-catalyst such as cobalt could be substituted in for cobalt as taught by Onopchenko and produce the same results because all are considered transition metals and therefore have similar properties.

Claims 20-26 and 32-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kollar (5321157) in view of Robbins (3988116).

Kollar teaches a process for the preparation of adipic acid and other aliphatic dibasic acids.

Kollar, example 1, teaches a process to produce dibasic acids comprising reacting cyclohexane, acetic acid solvent and cobalt acetate tetrahydrate with oxygen. Cyclohexane is a cycloaliphatic hydrocarbon, acetic acid is a lipophilic oxidation solvent and cobalt acetate tetrahydrate is a catalyst.

Although Kollar teaches an acetic acid solvent, Kollar, col. 5 lines 35-40, teaches preferred solvents include lower aliphatic monocarboxylic acids having about 2-6 carbons.

Although Kollar teaches an extraction of dibasic acids by quenching, Kollar does not teach other extraction methods using a solvent.

Although Kollar teaches extraction of the organic product from the catalyst and separation of individual acids, Onopchenko does not teach using a counter current flow liquid liquid extraction column.

Robbins teaches an apparatus for countercurrent liquid liquid extraction.

Robbins, col. 1 lines 5-15, teaches the objective is to remove one or more components from a liquid mixture by intimate contact with a second liquid. The second liquid is thus immiscible with the liquid mixture, but it functions as a solvent for removing the components from the mixture. A conventional apparatus widely used for performing liquid-liquid extractions is known as a sieve tray column, sometimes referred to as a perforated plate column.

Robbins, col. 3 lines 65-68, teaches a suitable extraction solvent is water.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the apparatus as taught by Robbins for extraction of the acids as taught by Onopchenko because Robbins teaches this is a conventional apparatus widely used for performing liquid-liquid extractions. Further, Robbins teaches the improved design overcomes a space problem and therefore increases the flow capacity of the column.

Regarding claim 21, Kollar, col. 5 lines 35-40, teaches preferred solvents include lower aliphatic monocarboxylic acids having about 2-6 carbons.

Regarding claim 22, Robbins, table 1a, teaches a first solvent can be water.

Regarding claims 23 and 24, Robbins teaches a liquid liquid extraction where both the solvent and the feed remain in liquid state.

Regarding claims 25 and 26, Robbins, col. 3 lines 68, teaches a suitable extraction solvent is water.

Regarding claims 32 and 33, the hydrocarbon is cyclohexane.

Regarding claims 34 and 35, Kollar, col. 5 lines 35-40, teaches preferred solvents include lower aliphatic monocarboxylic acids having about 2-6 carbons.

Regarding claims 36 and 37, Kollar, col. 5 lines 55-60, teaches particularly preferred catalysts are those containing cobalt, manganese or combinations thereof.

Regarding claim 38, Kollar, example 1, teaches the selectivity to adipic acid was 88.2 mole %, to glutaric acid was 6.2 mole %, and to succinic acid was 3.6 mole %.

Claims 20, 21, 27, 29-30 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kollar (5321157) in view of Ludmer et al (4954206).

Kollar teaches a process for the preparation of adipic acid and other aliphatic dibasic acids.

Kollar, example 1, teaches a process to produce dibasic acids comprising reacting cyclohexane, acetic acid solvent and cobalt acetate tetrahydrate with

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oxygen. Cyclohexane is a cycloaliphatic hydrocarbon, acetic acid is a lipophilic oxidation solvent and cobalt acetate tetrahydrate is a catalyst.

Although Kollar teaches an acetic acid solvent, Kollar, col. 5 lines 35-40, teaches preferred solvents include lower aliphatic monocarboxylic acids having about 2-6 carbons.

Although Kollar teaches extraction of the dibasic acids by quenching, Kollar does not teach an extraction process using 2 solvents.

Ludmer teaches a countercurrent separation process and apparatus. Ludmer, col. 1 lines 60-68, teaches two solvents are selected which at a first temperature are essentially completely miscible and at a second temperature are immiscible. These solvents are passed in countercurrent flow through a multi stage separation path of a series of alternating mixer zones and settler zones.

Further, Ludmer, Fig. 2, teaches solvent A is fed to the top of the column and solvent B is fed to the bottom of the column via counter current flow therethrough.

Further, Ludmer, table 1a, gives a list of two component systems of solvent A and solvent B.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the apparatus as taught by Ludmer for extraction of the acids as taught by Kollar because Ludmer teaches a high degree of purity and provides a high selectivity and maximum quantitative separation and recovery of the desired product at minimum time and expense compared to conventional methods.

Regarding claim 21, Kollar, col. 5 lines 35-40, teaches preferred solvents include lower aliphatic monocarboxylic acids having about 2-6 carbons.

Regarding claim 29, Ludmer, table 1a, teaches solvent A to be water and solvent B to be phenol which is an aromatic hydrocarbon.

Regarding claim 30, it would have been obvious to one of ordinary skill in the art at the time of the invention to substitute cyclohexane in for phenol as taught by Ludmer because both phenol cyclohexane is immiscible in water and therefore purification process would result in the same products. Further, it would have been obvious to one of ordinary skill in the art at the time of the invention to use cyclohexane as a solvent in order to save on materials and cost of the overall reaction.

Regarding claims 32 and 33, the hydrocarbon is cyclohexane.

Regarding claims 34 and 35, Kollar, col. 5 lines 35-40, teaches preferred solvents include lower aliphatic monocarboxylic acids having about 2-6 carbons.

Regarding claims 36 and 37, Kollar, col. 5 lines 55-60, teaches particularly preferred catalysts are those containing cobalt, manganese or combinations thereof.

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Ludmer teaches a countercurrent separation process and apparatus.

Ludmer, col. 1 lines 60-68, teaches two solvents are selected which at a first temperature are essentially completely miscible and at a second temperature are immiscible. These solvents are passed in countercurrent flow through a multi stage separation path of a series of alternating mixer zones and settler zones.

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Further, Ludmer, table 1a, gives a list of two component systems of solvent A and solvent B.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the apparatus as taught by Ludmer for extraction of the acids as taught by Kollar because Ludmer teaches a high degree of purity and provides a high selectivity and maximum quantitative separation and recovery of the desired product at minimum time and expense compared to conventional methods.

Regarding claim 31, Ludmer, col. 5 lines 35-45, teaches a feed mixture to be separated is fed to an intermediate point in the column.

Response to Arguments

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Applicant's arguments, filed 2/9/2009, with respect to the rejection(s) of claim(s) 20-38 under Richardson in view of Pesa and Wu and Richardson in view of Pesa, Wu and Boogers have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Onopchenko, Onopchenko in view of Robbins, Onopchenko in view of Ludmer, Kollar in view of Robbins and Kollar in view of Ludmer.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to STEFANIE COHEN whose telephone number is (571)270-5836. The examiner can normally be reached on Monday through Thursday 9:3am-6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Melvin Curtis Mayes can be reached on 5712721234. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Stefanie Cohen

5/12/2009

SC

May 12, 2009

/Melvin Curtis Mayes/
Supervisory Patent Examiner, Art Unit 1793